



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,275	08/10/2006	Christophe Regnier	361919-1024	5699

32914 7590 05/26/2010
GARDERE WYNNE SEWELL LLP
INTELLECTUAL PROPERTY SECTION
3000 THANKSGIVING TOWER
1601 ELM ST
DALLAS, TX 75201-4761

EXAMINER

IM, JUNGHWA M

ART UNIT	PAPER NUMBER
----------	--------------

2811

MAIL DATE	DELIVERY MODE
-----------	---------------

05/26/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/589,275	Applicant(s) REGNIER ET AL.	
	Examiner JUNGHWA M. IM	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 14, 15, 17-21 and 33-55 is/are pending in the application.
- 4a) Of the above claim(s) 33-43 and 51 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-11 is/are allowed.
- 6) ☒ Claim(s) 14, 15, 17-21, 44-50 and 52-55 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 14, 15, 17-21, 44-50 and 52-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilbarg et al. (US 5296408), hereinafter Wilbarg in view of You et al. (US 6147000), hereinafter You and Eldridge (US 6140200).

Regarding claims 14, 15, 44 and 49, Fig.'s 2A-2D of Wilbarg show a process for forming an integrated circuit, comprising:

forming a cavity in an absorbing material layer (10; Si wafer);

depositing a sacrificial layer (14) in the cavity; and

heating the integrated circuit to a temperature sufficient to cause the sacrificial layer to be absorbed into the absorbing material layer and leave a void.

Fig.'s 2A-2D of Wilbarg show most aspects of the instant invention except the sacrificial layer having a melting point in excess of a temperature used for integrated circuit component fabrication heating and filling the cavity with a fill material, therefore, leaving a void between the absorbing material layer and the fill material. You discloses a sacrificial material (Ta, Cr) having a melting point in a temperature in excess of 600°C used for integrated circuit component fabrication heating (col. 3, lines 33-40; col. 6, lines 45-56). It would have been obvious to one of ordinary skill in the art at the time of the

Art Unit: 2811

invention was made to incorporate the teachings of You into the device of Wilbarg in order to have the sacrificial material such as Ta, Cr with a melting point in a temperature in excess of 600°C to prevent the diffusion to the substrate.

The combination of Wilbarg/You shows most aspects of the invention except filling the cavity with a fill material, therefore, leaving a void between the absorbing material layer and the fill material. Fig.'s 5-6 of Eldridge show filling the cavity with a fill material (60). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Eldridge into the device of Wilbarg/You in order to have the cavity filled with a fill material, therefore, leaving a void between the absorbing material layer and the fill material to form a capacitor.

Regarding claim 17, it is obvious that the combination of Wilbarg/You/Eldridge would show circuit component fabrication heating comprises integrated circuit heat densification since the material forming the circuit component is hardened through heating.

Regarding claim 18, it is obvious that the combination of Wilbarg/You/Eldridge would show heating comprises using the heating step to not only cause the sacrificial layer to be absorbed but also to drive silicidation of the integrated circuit since the sacrificial material Ta reacts with the Si substrate.

Regarding claims 19, 44, 45, 54 and 55, You discloses the sacrificial layer includes a material selected from the group consisting of cobalt, nickel, titanium, tantalum, tungsten, molybdenum, silver, gold, iron and chromium (col. 3, lines 33-40).

Regarding claim 21, Fig. 6 of Eldridge shows the fill layer comprises an intermediate layer (66) and an electrically conducting layer (60).

Regarding claims 47, 48, 52 and 53, You discloses he sacrificial material has a melting point in excess of 700°C through in excess of 900°C. (col. col. 6, lines 45-56).

Regarding claim 50, Fig. 6 of Eldridge shows the absorbing material layer is a semiconductor substrate layer.

Allowable Subject Matter

Claims 1-11 are allowed.

The following is an examiner's statement of reasons for allowance.

Prior art fails to teach or render obvious, either singularly or with combinations of elements as set forth in the claims including, a process for fabricating an electronic integrated circuit, at least the limitation of "a portion made of a sacrificial material coming into contact with one face of the part of the substrate composed of absorbing material; forming a rigid portion in fixed contact with the substrate, on one side of the portion of sacrificial material opposite to said face of the part of the substrate composed of absorbing material; and heating the circuit in order to create a volume substantially empty of material by absorption of the sacrificial material into the part of the substrate composed of absorbing material, wherein the sacrificial material has a melting point in excess of 900°C and wherein the sacrificial material is chosen so as not to cause any material alteration of parts of the circuit in contact with the portion of sacrificial material prior to heating."

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 2/23/2010 have been fully considered but they are not persuasive. The rejection stands, modified only to accommodate the amendments made to the claims by Applicant. New rejections are made in response to Applicant amended claims. In addition, the examiner presents the remarks below in response to Applicant's arguments.

Applicant argues that "... Claims 33-43 have been withdrawn. ... The difference between the two embodiments concerns where the capacitor is formed. ... Rejoinder of these claims is requested." This is not persuasive. As discussed previously, claims 33-43 reflects Fig.'s 6-8 that is a different embodiment. In particular, the difference of the embodiments lies in the location of the absorbing layer in the semiconductor substrate layer. However, rejoinder of these claims is considered when the pending claims are in condition of the allowance.

Applicant argues that "It is the Examiner's position that Eldridge Figures 5-6 teach a fill material 60 for filling a cavity ... The material 60 in Eldridge is a metal layer (col. 7, line 38) forming the second electrode of the capacitor. This metal layer 60 is deposited over the cavity. There is no teaching or suggestion in Eldridge for using metal

Art Unit: 2811

layer 60 to fill a cavity.” This is not persuasive. Fig. 2 of Eldridge shows a fill material 20 in the cavity over the sacrificial layer 22, resulting in the fill material 20 in a void. And Eldridge the fill material 60 is formed over the sacrificial layer 58, therefore, also forming a void. (col. 7, lines 15-29).

Applicant argues that “Claim 14 further recites ‘heating the integrated circuit to a temperature sufficient to cause the sacrificial layer to be absorbed into the absorbing material layer and leave a void between the absorbing material layer and the fill material.’ In Eldridge the metal layer 60 functions as the absorbing material which absorbs the sacrificial mass 58. Applicants claim 14 clearly recites that the ‘absorbing material layer’ is a layer distinct from the ‘fill material.’ Contrary to the claimed invention, Eldridge teaches the metal (alleged fill material) layer 60 also functioning as the absorbing material layer. In this configuration, the metal layer 60 cannot also meet the claimed ‘fill material’ limitation. This is not persuasive. Note that the absorbing layer in the instant invention is a substrate of absorbing material (Si), and Eldridge’s cavity is formed in the Si substrate. Therefore, Eldridge teaches absorbing material layer in addition to the fill material that also partially functions as the absorbing layer.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUNGHWA M. IM whose telephone number is (571)272-1655. The examiner can normally be reached on MON.-FRI. 7:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on (571) 272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2811

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lynne A. Gurley/
Supervisory Patent Examiner, Art
Unit 2811

/J. M. I./
Examiner, Art Unit 2811